
Space Weather Forecast

Issued on Saturday, 11 November 2023 at 13:26 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: G1 to G2 Minor to Moderate geomagnetic storm expected over UTC weekend, chance G3 Strong geomagnetic storm at peak.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over past 24 hours, with only Common-class flares. The largest events were two modest Common-class flares observed at 11/0359UTC and 11/0916UTC, both originating from the largest and magnetically complex sunspot region, which is located in the northwest quadrant of the solar disc. There are currently five sunspot regions on the Earth-facing disc, which appear to clustered in the western solar hemisphere, especially in the southwest quadrant.

Also of note was a long-period Common-class flare around 10/1930UTC from a potentially complex portion of the Sun, which encompasses up to three sunspot regions. This flare appears to have produced a Coronal Mass Ejection (CME). Initial analysis results suggests a possible Earth-directed CME arriving beyond the current forecast period (sometime on 15 Nov), although further analysis is currently on-going to firm up on the details of this event. This source region is in the same vicinity as that which produced the Earth-directed full halo CME of 09 November, which currently dominates the forecast. A filament eruption (arc of plasma lifting off the Sun's surface) was also observed to have lifted-off the northwest quadrant at 11/0600UTC, which has produced a CME. This event is yet to be analysed for any potential Earth-directed component. No other Earth-directed CMEs have been observed in the past 24 hours.

Solar Wind / Geomagnetic Activity: Solar winds overall are felt to be reflective of the waning enhancement from a fast wind regime stemming from a 'coronal hole'.

Solar wind speeds fell from strong to elevated, while the number of particles comprising the wind was steady and at background levels. The associated magnetic field was steady and comfortably within background, with a varying and small-scale north-south component. The net result of the above solar wind measures was for provisionally mainly Quiet geomagnetic activity.

Energetic Particles / Solar Radiation: Solar radiation levels have now declined to background levels, after recent activity in response to the Common-class flare and associated 09 November Earth-directed CME.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity carries a daily slight chance of increasing to moderate, although recent flare activity has been low and is therefore perhaps the least noteworthy aspect of the forecast.

Solar Wind / Geomagnetic Activity: One CME from the southwest at 10/1930UTC is awaiting imagery for assessment, with a second candidate for a CME also seen at 10/2130UTC.

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The geomagnetic forecast is otherwise dominated by the expected arrival of the 09 November CME, currently posited for 12/0001UTC. G1 to G2 Minor to Moderate geomagnetic storms are expected at peak, with a chance of G3 straddling the midnight separating both UTC days. Geomagnetic activity leading up to and subsequent to this is expected to be much quieter, most reliably so to end the four-day period.

UK Aurora Forecast: Aurora may be visible in parts of Scotland and Northern Ireland during Saturday night into Sunday (11-12 Nov) perhaps as far south as northern England and Wales. Confidence then lowers into the new working week, as although quieter conditions are forecast, there is potentially a further CME to arrive, probably beyond this forecast period, which is currently under-going analysis.

Energetic Particles / Solar Radiation: There is a daily slight chance of S1 or greater should any of the western solar hemisphere sunspot groups produce suitable flares in the period. This risk should begin to wane towards the middle of the coming UTC working week as these sunspots progress onto the far side.

Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	70	90	20	1
Strong	G3	No	30	30	1	1
Severe	G4	No	5	5	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	20	20	20	15
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm ⁻² sr ⁻¹ s ⁻¹)						